# Thinking About the Patent System: Does Patent Disclosure Drive Future Innovations?

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## Introduction

The question of whether patent disclosure stimulates future innovations and promotes subsequent progress in R&D has received contradictory responses, with fervent debates and controversies. In a world in which businesses and governments are increasingly competing in the speed and quality of innovations, the exploration of the effects of patent laws and their disclosure in relation to wider intellectual property laws has gained increasing significance due to the central role of innovation in economies around the world. This topic is closely associated with the maximizing of the value of businesses for the greater social good. What stakeholder values to prioritize is not only a question for businesses but also a structural issue faced by policymakers in order to optimize the value that individual businesses can generate. Patents and patent disclosure effects require deeper exploration in this regard.

## What Is the Patent System?

In order for us to understand patent disclosure and its effects on the innovation trajectory of an economy, it is first necessary to understand the patent system. The patent system is seen as an act of public disclosure of know-how to society in exchange for an exclusive right to commercialize an invention for a period of time. The underlying purpose of such disclosure therefore is to inform society of an internal rationale and the details of an invention, thus informing the public while preventing the copying of the invention by extending protection of commercialization. Patent disclosure not only captures the findings but also discloses the formula of inventions to the world by granting the innovator the exclusive right for a limited time to commercialization to generate returns and encourages other innovators to utilize the knowledge that existed to get around the patent by using that knowledge for other inventions. The system is supposed to promote more follow-on innovations that utilize previous patent knowledge.

However, whether the patent system and disclosure indeed promotes follow-on innovations has been subject to disputes among legal scholars and other academics. It is claimed by many academics that in order to avoid unconscious infringement of patent rights, many innovators would avoid reading previously filed patents to reduce the possibility of infringement, given their exclusivity. Others also argue that patents often induce vagueness so that follow-on innovators find it difficult to read and understand the content of such patents, therefore reducing the innovative capacity of the researcher and reducing the positive disclosure effect that patents bring for follow-on innovations.

## Academic Arguments on the Role of Patents in Promoting Innovation

So far, there are only four academic papers by scholars that analyze this issue and there are differences in terms of their approaches. The key question in the four articles is whether the disclosure function of patents plays a role in subsequent innovations. This is important for innovation policy because patents are one of the primary mechanisms that governments use to provide incentives for innovation. Government provision of incentives for innovation is necessary, because a free and totally unregulated market does not provide socially optimal levels of incentives for innovation. The reason for this is positive externalities: in the absence of government intervention, firms will be unable to achieve the full levels of profits associated with their innovations, thus reducing their incentives to invest in them. Patents help address that problem by enabling firms to monopolize rents, i.e., by enabling firms to prevent others from using their innovations for a limited amount of time (currently 20 years in the United States), thus giving firms with patents the opportunity to claim a stream of income from their innovations during the time the patent is active.

But this exclusionary right creates an economic inefficiency in the market, as it leads to a short-term monopoly. To address this problem, patent laws require inventors to disclose all relevant information in their patents to enable future generations of innovators to build upon the discoveries that led to the patent. Firms, of course, have incentives to limit the value of information disclosed in patents, as the disclosure of technical secrets could enable future competition or even current competition by enabling rivals to invent around existing patents. In fact, many legal scholars doubt that the information disclosed in patent documents could, in practice, enable

follow-on innovations. Knowing whether these doubts have a basis in fact is important for considering ways to design the patent system. Ideally, the patent system would (a) encourage innovation by providing strong incentives to invest in innovation and (b) encourage follow-on innovations by enabling future generations of innovators to build upon the innovations of today (as this minimizes the social losses associated with the temporary monopolies enabled by patents). Until recently, we have not had great evidence, however, about whether the disclosure requirement achieves its goals of enabling future innovations.

The first approach examined by Jeff Furman (Furman, J. L., M. Nagler, and M. Watzinger (2018): "Disclosure and Subsequent Innovation: Evidence from the Patent Depository Library Program," NBER Working Paper, No. 24660). studied data coming from the expansion of patent libraries from 1975 to 1997 – libraries that provided patent disclosure to the public and innovators seeking more inspiration so as to gain a better understanding of the effect that patents could have in enhancing the innovative capacity of a region. It is critical to understand the role of the United States Patent and Trademark Office (USPTO) in considering this approach. This is an agency that grants patents to companies and examines patent-related issues pertaining to companies and their trademarks. The USPTO patent system was a pre-Internet era library that provided patent information to the regions and is one of the only places where the public could get access to patent information outside of Washington, DC in the US. Therefore utilizing patent library disclosures and their effects on regional innovative capacity could illustrate the effect that such critical information could bring.

In short, the USPTO system provides individuals and businesses with access to patent and trademark-related information. Beginning in 1975, the USPTO started expansion of at least one patent library to a state and this brought about a comparative controlled analysis of understanding of the innovative effects on a region. Understanding the differential effect of Federal Deposit Libraries (FDLs), in this case set up as a control with patent libraries, patent libraries could illustrate the effect of patents on the innovative capacity of regions, as patent libraries used to be FDLs and having them as a control could single out the effects of patent disclosure on subsequent innovations.

The result of such research illustrates that the number of patents that are within 15 miles of the opened patent libraries had their follow-on innovation-induced patents increased by 8-20% in relation to a baseline patenting rate. In addition, there is no finding that suggests that the patent quality induced by the opening up of patent libraries is lower than other means. However, the research does suggest that patent information disclosure via patent library openings could only increase local innovations and local patenting as the effect of patenting becomes much weaker outside of 50 miles, an approximate commute distance, showing that innovations as a result of opening of patent libraries are localized. This paper therefore suggests that the opening of patent libraries – in other words, an increase in the accessibility of patent documents – does indeed promote follow-on innovations as suggested by the evidence of how patent libraries induced more patenting and local innovations in a region. The study found that the disclosure effects on innovations are strongest in disciplines such as chemistry, as a chemistry formula as technical information is the easiest to understand for innovators in this field *(Table)*.

This study also inspired an intellectual property study to further invest in increasing regional research-enhancing facilities such as patent libraries for innovators to get better access to prior arts in order to know what has already been patented and what they could do with the disclosed information to create new inventions that do not infringe on existing patents. It should also be noted that the construction of such facilities also makes sense from an economic point of view, as the cost of construction did not exceed the follow-up innovation returns that such facilities brought to the local economies. Therefore, in the Internet era today, it should also be noted that investment in research categories of patents could make it easier for researchers and innovators to distill more useful information for inventions while not infringing on existing patents and their rights.

Another approach was carried out by researcher Daniel Gross ("The Hidden Costs of Securing Innovation: The Manifold Impacts of Compulsory Invention Secrecy," 2019, https://doi.org/10.3386/w25545) that utilized the experiment of a compulsory secrecy order by the US government during World War II to measure the effects of patents and follow-up patenting, whereby innovators were not to disclose patent information or commercialize inventions but received a sum of royalties for limited usage from the government. A measurement of follow-on innovations was conducted using the content-based strategy of finding similar words within patents as

TABLE

## Summary statistics in the year before opening

***Main sample***

| | Patent Libraries | Control Libraries | Diff | P-Value |
|---|---|---|---|---|
| Population in 100,000 | 7.60 | 7.41 | -0.19 | 0.93 |
| University Library | 0.67 | 0.69 | 0.03 | 0.73 |
| #Patents | 128.29 | 81.82 | -46.46 | 0.09 |
| #Patents/100,000 | 15.68 | 11.53 | -4.15 | 0.11 |
| Citation-weighted patents | 226.76 | 173.58 | -53.18 | 0.25 |
| Dollar-weighted patents | 83.80 | 115.90 | 32.10 | 0.46 |
| #Pat. small firms/100,000 | 7.25 | 6.03 | -1.22 | 0.26 |
| #Pat. big firms/100,000 | 8.43 | 5.49 | -2.94 | 0.14 |
| #Pat. young firms/100,000 | 5.45 | 4.35 | -1.09 | 0.23 |
| #Patents old firms/100,000 | 10.23 | 7.17 | -3.06 | 0.15 |
| Number of libraries | 48 | 406 | | |

***Patents by field***

| | Patent Libraries | Control Libraries | Diff | P-Value |
|---|---|---|---|---|
| Electrical Engineering | 2.23 | 1.94 | -0.28 | 0.60 |
| Instruments | 2.27 | 1.69 | -0.58 | 0.14 |
| Chemistry | 4.02 | 2.01 | -2.01 | 0.11 |
| Process Engineering | 2.02 | 2.14 | 0.12 | 0.78 |
| Mechanical Engineering | 2.98 | 2.07 | -0.92 | 0.26 |
| Other Fields | 2.14 | 1.67 | -0.47 | 0.27 |

*Note: This table shows the averages of the data for patent libraries and associated control libraries in the year prior to patent library opening. The last two columns show differences with the associated significance levels. A firm is defined as young if its first patent was filed less than three years before the opening of the patent library. Otherwise it is old. A firm is defined as small if it has no more than 20 patents before the opening of the patent library. Otherwise it is large. The p-values result from a t-test with unequal variances.*

*Source: Furman, J. L., M. Nagler, and M. Watzinger (2018): "Disclosure and Subsequent Innovation: Evidence from the Patent Depository Library Program," NBER Working Paper, No. 24660.*

well as looking for citations with previous patents as input, so that intellectual property would not be disclosed to anybody other than the US government. A citation pattern of 505 prior patents was analyzed in a study and illustrated a negative relationship between the secrecy order and follow-on innovations, as the order reduced follow-up patenting by 30-50%, illustrating that the current patent system, which required exclusive commercial use but disclosure of the patent knowledge, does indeed promote more innovations as a compulsory secrecy order would impede such progress.

Lastly, there was an experiment regarding the passage of the American Inventors' Protection Act (AIPA) of 1999, which sped up patent disclosure of US patents by two years. This research was conducted by Gaetan De Rassenfosse (De Rassenfosse, Gaétan, et al. "Do Patents Enable Disclosure? Evidence from the Invention Secrecy Act," SSRN Electronic Journal, 2020, https://doi.org/10.2139/ssrn.3561896) and compared the effect of the AIPA's passage on US patents in terms of follow-up citations, as a way to measure the disclosure effect on innovations and the Japanese patents which were not subject to the effect of the AIPA. The research suggests that the passage of the AIPA increased the diffusion of patent knowledge in the US and increased the knowledge differences between highly similar patents and decreased that between highly diffused knowledge as a result of the acceleration of patent disclosure. The comparison of US patenting trends to the Japanese trend could illustrate the effect of rapid disclosure and its effect on follow-up patenting, as measured by the clue of follow-up citations and information disclosure, as Japanese patents were always disclosed at 18 months. In other words, early disclosure of patent information promotes more innovations.

## Conclusion

This essay adds to the existing articles of research on this topic by integrating the approaches and data described by the four different approaches to patent disclosure effects. The conclusion is that patents and the creation of more patents are seen as equivalent to the capacity of greater innovations and is a proxy of knowledge diffusion that resulted in an increase in productivity. JS

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